

VALIDATED MEASURES OF CHRONIC OCCUPATIONAL NOISE ON HYPERTENSION DIAGNOSIS

Author list:

Jane E. Clougherty (1)*, Deron Galusha (2) Peter Rabinowitz (2), Mark R. Cullen (3)

*Corresponding author: Jane E. Clougherty, MSc ScD, Assistant Professor, University of Pittsburgh Graduate School of Public Health, Department of Environmental and Occupational Health, Bridgeside Point, 100 Technology Drive, Suite 350, Pittsburgh, PA 15219; Email: jcloughe@pitt.edu, Phone 412-624-7494, Fax 412- 624-3040.

Institutional Affiliations:

- (1) University of Pittsburgh Graduate School of Public Health, Department of Environmental and Occupational Health, Pittsburgh PA, USA
- (2) Yale School of Medicine, Occupational and Environmental Medicine Program, New Haven CT, USA
- (3) Stanford University School of Medicine, Palo Alto CA, USA

Word count: 262

Background and Aims

Studies report positive associations between occupational noise and cardiovascular illness, although several potential casual pathways exist. Noise may directly affect auditory function as a physical exposure, or as a chronic stressor. Noise effects may also be confounded by work-related physical hazards, including heat and chemical agents. Finally, accurate ascertainment of true occupational noise exposures is complicated, due to more vigilant use of hearing protection (HP) in noisier environments.

Methods

We use a unique dataset of in-ear (past HP) noise dose measurements to adjust ambient noise measurements. We then perform multivariate logistic regression analyses predicting hypertension onset, using each of three alternative noise metrics: (1) ambient noise, (2) HP-adjusted ambient noise, (3) hearing loss (an indicator of chronic noise exposure from all sources).

Cohort data is derived from company records and health claims files for aluminum manufacturing employees in eight U.S. states. The dataset includes noise measures on 14,807 employees, with sufficient detail at the individual, job, and plant levels to examine multiple workplace factors affecting cardiovascular health.

Results

Preliminary analyses reveal significant variability, within and across plants, in noise exposures and hypertension outcomes. Analyses using ambient noise display consistent *inverse* associations with hypertension, which may be due to exposure misclassification or healthy worker effects. Preliminary analyses using hearing loss suggest non-significant positive associations with hypertension onset overall, though a subset of

plants demonstrate significant risks predicted by hearing loss.

Conclusions

Just as pathways for chronic noise exposures on cardiovascular health remain unclear, it remains unknown whether hearing protection can modify hypertension risk. If more refined analyses of HP-adjusted noise exposures better predict hypertension, this suggests that HP interventions may effectively reduce cardiovascular risk.